

JENOLAN CAVES ENGINEERING WORKS

Report

on the Ceremony for the unveiling of the

Historic Engineering Marker

on Saturday 28 September 1996

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Prepared by:
M.N. Clarke
17 October 1996

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**Report on Ceremony for the Award of an
Historic Engineering Marker
to
JENOLAN CAVES ENGINEERING WORKS**

Introduction

The plaquing of the Jenolan Caves Engineering Works was carried out as part of the Pre Conference Tour of the First International and Eighth National Engineering Heritage Conference, held in Newcastle from 29 September to 2 October 1996.

The nomination report was prepared by Dr Don Fraser and Michael Clarke of Sydney Division's Engineering Heritage Committee. They had substantial assistance from Ernst Holland, Karst Resources Manager of the Jenolan Caves Reserve Trust, various guides and particularly from Susan Hardy and Joan Edwards of the Jenolan Cave Historical and Preservation Society (JCHAPS). Generous assistance was also received from the Department of Public Works and Services, through the search of records in Sydney and Bathurst and the provision of plans.

In preparing the report and the plaque wording, special attention was given to acknowledging the part played by guides in the construction of paths, stairs, fences, bridges etc within the Caves - work of an engineering nature, but not necessarily performed by engineers. This represents an incredible expenditure of physical effort, as all the materials had to be carried in limited capacity packs and the concrete mixed and placed, variously by small machines and barrows and by hand.

Once the nomination had been approved by the Commemorative Plaquing Sub Committee and agreement reached with them on the wording of the plaque, the wording was faxed to the Caves Trust for its concurrence. This was received without amendment.

Plaquing Preliminaries

On 9 July, Bill Jordan, Chairman of the Newcastle Engineering Heritage Panel and Michael Clarke, Chairman of the Sydney Engineering Heritage Committee, met at Jenolan Caves with Ted Reedy, General Manager of the Caves Trust and with Ernst Holland, to plan the ceremony and the issue of invitations. A copy of the letter of 14 June 1996 which contains the agenda for the meeting is at Attachment 'A'.

At the meeting, agreement was reached on all matters and:

- a copy of the nomination report was provided to Mr Reedy;
- a draft invitation was provided to Mr Reedy, together with The Institution's invitation list and sample ceremony pamphlets;
- a publicity strategy was agreed;
- the permanent site for the plaque was selected as being on a rock to be obtained and placed next to the start of the track on the right bank of the Jenolan River, adjacent the limestone arch bridge designed by E.M. De Burgh; and
- the site for the ceremony was selected as a cave tour assembly area, inside the Grand Arch.

Subsequent to the meeting, Mr Clarke prepared and provided to the Trust, a suggested Program and notes for the preparation of the ceremony pamphlet, both of which were adopted with little alteration (Attachments 'B' & 'C').

Speech notes for Mr Mike Goethel, Deputy President of Sydney Division who was to unveil the plaque, and for Mr Paul Hagenbach, Chairman of the National Committee on Engineering Heritage, who was to speak about the plaquing program, were also prepared by Mr Clarke (Attachments 'D' and 'E'). Copies were provided to the Trust to avoid unnecessary repetition in the speeches.

The Trust had printed, tastefully designed 156 mm x 110 mm card invitations, issued jointly by the Chairman of the Trust and the President of The Institution, under the logos of both organisations (Attachment 'F').

The Ceremony

The Pre Conference Tourists spent the night before the ceremony at Jenolan Caves and were treated to a special 3 1/2 hour cave tour. The tour was conducted by Mr Barry Richard, Technical Services Manager and was tailored to the interests of engineers concerned with heritage.

Including the 24 members of the Pre Conference Tour, the ceremony was attended by about 90 to 100 people. A former guide who retired in ill health from the effects of cement dust contracted by carrying cement into the caves for construction of paths etc, travelled the 400 odd kilometres from his home on the north coast of NSW to be present.

The Trust had prepared for the occasion, an attractive Program and commemorative pamphlet which were distributed to all present, prior to the ceremony (Attachments 'G' and 'H').

During the ceremony, Mr Hagenbach presented to JCHAPS for their archives, a copy of the nomination report and the numerous plans of particularly the water and sewerage works and dams, obtained during the course of research, from the Department of Public Works and Services. These were received respectively by Mrs Joan Edwards and Mrs Susan Hardy on behalf of JCHAPS.

In turn Mr Hagenbach received on behalf of The Institution from Mr Warwick Bennet the Trust Chairman, a framed photograph c 1920s, of the De Burgh bridge.

The plaque, which was located for the occasion on an easel, was unveiled by Messrs Goethel, Bennet and the Hon. Jan Burnswoods, MLC and Mr Hagenbach.

Following the ceremony, the Trust provided a splendid morning tea and visitors were able to inspect a photographic display of the Caves.

Whilst the Tour coach had to depart at 11.30 am, the Trust provided another extensive cave inspection similar to that of the night before. This was very favourably commented upon by the many guests who participated.

Important Attendees

The Institution of Engineers:

Mr Mike Goethel, Deputy President Sydney Division and Mrs Margaret Goethel
 Mr Alex Baitch, Member Sydney Division Committee and Councillor and Mrs Baitch.
 Mr Fred Hespe, Councillor and Mrs Faye Hespe
 Mr Paul Hagenbach, Chairman National Committee on Engineering Heritage
 Mr Bill Jordan, Chairman of Newcastle Engineering Heritage Panel and Mrs Judith Jordan
 Mr Michael Clarke, Chairman Sydney Engineering Heritage Committee and Mrs Annie Clarke

Apologies were received from the following Institution invitees:

Mrs Elizabeth Taylor, President Sydney Division
 Dr Charles Gerrard, Director Sydney Division.

Jenolan Caves Reserve Trust:

Mr Warwick Bennet, Chairman Jenolan Caves Reserve Trust
 Mr Monty Cotton, Member Jenolan Caves Reserve Trust and Mrs Cotton
 Mr Ted Reedy, General Manager Jenolan Caves Reserve Trust

Jenolan Caves Historical and Preservation Society

Mr Arthur Gray, President
 Mrs Joan Edwards, Research Officer
 Mrs Susan Hardy, Archivist

Others:

The Hon. Jan Burnswoods MLC
 Senator Susan West
 Prof. Emory Kemp of West Virginia University, Eminent Speaker Engineering Heritage
 1996 and Mrs Prof. Kemp
 Mr Brian Mowbray, Regional Manager (Bathurst) Department of Public Works and
 Services.

Photographs

Photographs of the ceremony are at Attachment 'I'.

Thanks

A copy of a letter of thanks from the Trust including copies of press reports is at Attachment 'J'.

A copy of the letter from The institution thanking the Trust is at Attachment 'K'.

Mr Goethel rang Mr Clarke to express his delight and appreciation of the occasion.

Distribution of Nomination Reports

Apart from the provision of nomination reports to the Commemorative Plaquing Sub Committee, to The institution's National Office, Jenolan Caves Reserve Trust and JCHAPS, copies were provided to the Heritage Section of the Department of Public Works and Services (Attachment 'L') and its Bathurst Regional Office.

Future Publications and the Internet Home Page

In accordance with resolutions of the National Committee on Engineering Heritage, a draft summary page is provided at Attachment 'M', for inclusion in the proposed Volume 2 of *The Historic Engineering Plaques of Australia* and for publication in the Committee's World Wide Web Home Page.

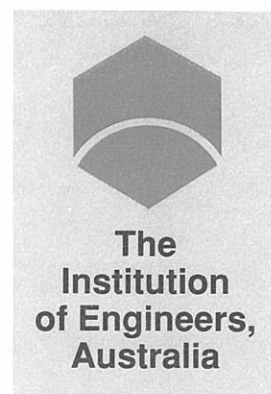
Whilst the summary page is immediately available for publication on the Internet, prior to its publication in *The Historic Engineering Plaques of Australia* Vol. 2, photographs will need to be provided of EM de Burgh and some aspect of the caves, possibly the Lucas Cave bridge.

Distribution of Ceremony Reports

Copies of this ceremony report have been distributed as follows:

The Institution of Engineers' National Office Library	2
The Institution of Engineers' file	1
Jenolan Caves Reserve Trust	1
Sydney Division Engineering Heritage Committee	1

41 Portland Street
Enfield 2136
14 June 1996



SYDNEY DIVISION

Mr Ted Reedy
General Manager
Jenolan Caves Reserve Trust
Cnr Great Western Highway and Littlemore Streets
Bathurst 2795

Dear Ted

Commemorative Plaquing of JENOLAN CAVES ENGINEERING WORKS

I am pleased to advise that the nomination of the Jenolan Caves Engineering Works for an **Historic Engineering Marker** has been approved by The Institution's Commemorative Plaque Sub Committee.

In preparing the nomination, we have been greatly assisted by your officers at the Caves, in particular Ernst Holland and Dave Rowling, and by Joan Edwards and Sue Hardy of the Jenolan Caves Historical and Preservation Society. For their help, we are most grateful.

Piecing together the history of the engineering at Jenolan has not been easy. In addition to the invaluable information provided through JCHAPS, it has required a great deal of research - in places like libraries and the plan rooms of Public Works' Head Office and Bathurst. Even now there are some "holes", which hopefully can be filled in the future, through detailed research by others. For our part, we were unable to go further because of time constraints.

However, we trust the Nomination Report will be a substantial contribution to the Trust's and JCHAPS' knowledge and understanding of the significance of the engineering effort. In addition, we have produced an Appendix to the report of supporting information, and have obtained many plans, mostly of early water supply and sewerage works, from Public Works (now Public Works and Services). A description of the plans together with their microfilm numbers is in the Appendix. The plans and a copy of the Appendix will be donated to JCHAPS for their archives.

I note that in my first fax of 8 August last year, I mentioned the ceremony would be on "morning of Saturday 31 September". Unfortunately, I must have been looking at the wrong place in the calendar, as the Saturday is 28 September - I hope this has not caused confusion. To suit the itinerary of the Pre Conference Tour, we would like to hold the ceremony at 10 am so buses can depart by 11.30 am.

As agreed this morning, we now need to meet to plan the ceremony and the issue of invitations. I will await your advice as to whether 4 or 9 July suits you best. I live near Strathfield and could get away by say 8 am.

In the mean time, I would appreciate your concurrence to the plaque wording, as soon as possible.

Matters which now need to be addressed and which we might discuss at our meeting are:

- Permanent location of plaque.
- Location and logistics of the ceremony, including fallback arrangements in the event of inclement weather. (Note that it is often not possible to hold the ceremony immediately adjacent the site proposed for the plaque. In such situations, the plaque is temporarily attached to a stand for unveiling and then fixed in its permanent position later).
- Preparation of invitation lists. I expect to bring our list with me to the meeting.
- Preparation and issue of joint invitations. In this regard, I expect to bring a bromide of The Institution's logo for use on the invitation.
- Preparation of a handout Program and pamphlet or brochure, descriptive of the work being commemorated and its significance.
- Whether there will be a visual display.
- Provision if deemed appropriate, of refreshments - say a light morning tea.

As requested, I will fax this letter. The original will go in the post today, together with a copy of The Institution's *Guide to The Australian Historic Engineering Plaquing Programme*. This contains a detailed discussion about ceremony arrangements on pages 13 to 20. Copies of the Guide have previously been provided to Andrew Fletcher and others at the Caves.

Might I say again how much we appreciate the Trust's assistance and co operation in this venture.

I will look forward to our meeting in the next few weeks.

Yours sincerely

Michael Clarke
Chairman
Engineering Heritage Committee

- FACSIMILE -

Total pages
(including this one)

2

TO:
Mr Ted Reedy
General Manager
Jenolan Caves Reserve Trust

FROM:
Michael N. Clarke
41 Portland Street
Enfield 2136

DATE: 11 August 1996

FAX NUMBER:
(063) 32 9399

TELEPHONE AND FAX NUMBER:
(02) 745 3752

-- oOo --

Dear Ted

Commemorative Plaquing of JENOLAN CAVES ENGINEERING WORKS

The purpose of this fax is to bring you up to date on a couple of matters and to offer a few more thoughts on the plaquing ceremony.

Institution of Engineers' Representative

Mrs Elizabeth Taylor, President of Sydney Division of The Institution of Engineers, Australia is very disappointed she will be unable to be present, as she has a prior engagement and is unable to break it. Her apologies are extended and should be acknowledged on the day.

The senior Institution representative will be the Vice President of Sydney Division Mr Mike Goethel, who will be the main speaker for The Institution and will jointly with a Jenolan Caves representative, unveil the plaque.

Mr Goethel will be President of Sydney Division next year. His address and contact numbers in case you need to get in touch are:

Mr Mike Goethel
5/2 Cherry Street
Turramurra NSW 2074

Tel: 9449 6015

Fax: 9988 4458

Ceremony

We find it best to have a reasonably short ceremony - say not more than 30 minutes.

The institution only requires two speakers - someone to talk about the Plaquing Program, and a person to give some historical information about the works.

We would see the ceremony proceeding along the following lines, but perhaps you would like something a bit different. Could you let me know your views please, together with the names of those who will be participating in the ceremony on behalf of the Jenolan Caves Reserve Trust?

PROGRAM (for discussion)

Master of Ceremonies to extend apologies, introduce speakers and make announcements - **Jenolan Caves Reserve Trust.**

Welcome to guests and purpose of ceremony - **Jenolan Caves Reserve Trust.**

Description of Historic Engineering Plaquing Program and presentation of Nomination Report and plans to JCHAPS - Mr Paul Hagenbach, Chairman National Committee on Engineering Heritage, **The Institution of Engineers, Australia.**

Description of Jenolan Caves (say brief history, premier tourist destination, current challenges, the future) - **Jenolan Caves Reserve Trust.**

Description of Jenolan Caves Engineering Works - Mr Mike Goethel, Vice President Sydney Division of **The Institution of Engineers, Australia.**

Unveiling of Plaque - representative of **Jenolan Caves Reserve Trust** and **Mr Mike Goethel.**

Vote of thanks, invitation to refreshments, viewing of exhibit and guided tours? and close of proceedings - **Jenolan Caves Reserve Trust.**

Invitations and Commemorative Pamphlet

I presume you received the notes for the pamphlet I faxed to you on 15 July.

Could you fill me in on progress with the pamphlet and the invitations please? We should probably be getting the invitations out in about a couple of weeks, don't you think?

Presentation to JCHAPS

As indicated in the draft Program, we would like to present a copy of the nomination report and the plans we obtained from the Department of Public Works and Services, to a representative of JCHAPS for inclusion in their archives.

Would you please advise them of this and let me know who will be the recipient on the day, so I can include their name in our speech notes?

Regards

- FACSIMILE -

Total pages
(including this one)

6

TO:
Mr Ted Reedy
General Manager
Jenolan Caves Reserve Trust

FROM:
Michael N. Clarke
41 Portland Street
Enfield 2136

DATE: 15 July 1996

FAX NUMBER:
(063) 32 9399

TELEPHONE AND FAX NUMBER:
(02) 745 3752

-- oOo --

Dear Ted

Commemorative Plaquing of JENOLAN CAVES ENGINEERING WORKS

Following are the items I promised to send you, during our meeting last Tuesday.

Address

Bob Jackson (Journalist)
Work: C/- *Engineers Australia*
PO Box 588
Crows Nest NSW 2065

Home: 16/150 Wigram Road
Glebe NSW 2037

Media Contacts

Two pages following, but I expect you will know these anyway.

Institution of Engineers Logo

For One Colour Reproduction: Black is the first preference with red (PMS 485) the second.

Two Colour Reproduction: Red (PMS 485) for the hexagon and PMS Black 100% for the type.

Commemorative Pamphlet

Three pages of notes follow.

Could I comment on the draft, please?

Invitations

I would think these should issue 4 or 5 weeks in advance - do you agree?

Please don't hesitate to call if you would like to discuss any details.

Regards

Michael Clarke
Chairman
Engineering Heritage Committee

Notes for the Souvenir Pamphlet for The Commemorative Plaquing of

JENOLAN CAVES ENGINEERING WORKS

The Jenolan Caves are a world renowned example of limestone caves surrounded by a 2416 hectare wildlife reserve. They have been open to the public for over 150 years and are believed to have been first explored by European settlers in 1838.

Originally parties of tourists reached the caves after a full days slow horse ride usually from Tarana, with pack horses laden with provisions and camping equipment. The final descent to the Grand Arch was by foot.

Within the caves, each visitor carried a lighted candle and scrambled over rocks and through what natural passageways they could find. Smoke and dripping wax from the candles caused pollution and discoloured formations, and visitors broke off pieces of the formations for souvenirs.

Drinking water was obtained from the then pristine streams, whilst toilet and waste disposal facilities were of the most primitive kind.

Fortunately, there was fairly early recognition of the threat of pollution and despoliation. The caves and the surrounding country were declared a public reserve on 2 October 1866 and a year later, Jeremiah Wilson was appointed non-resident caretaker. In 1872 the Government issued a notice making "mutilating and destroying stalactites" a punishable offence.

As tourism developed, so did the need for better access, accommodation, illumination, water supply and sewerage.

Roads

The first road into the caves was from Tarana railway station via Hazelgrove and Oberon. It was completed in 1879 with the Zig Zag or Two Mile Hill descent.

The extension of the then existing road to Hampton and construction down the Five Mile Hill was completed to within half a kilometre of the Grand Arch in 1887. Visitors alighted at the "turntable" and walked to the caves or accommodation, while their luggage followed on pack horses.

Nine years later (1896) the road was extended through the Grand Arch to link up with the Oberon Road. It crossed the Jenolan River on the beautiful limestone arch bridge designed by the Public Works engineer E.M. de Burgh.

Accommodation

Jeremiah Wilson built the first accommodation in about 1880 and the first two storey guest house in 1887. He added another by the early 1890s, but it burned down in 1895.

A new limestone wing was added to the original two storey building in 1897 and there were further expansions of accommodation in 1916, 1923 and 1986.

Water Supply

The first significant water supply (c1897) was an hydraulic ram on the Jenolan River downstream of the Grand arch, pumping to a small concrete reservoir just beyond the guest house. It was replaced by a pump driven off the Leffel water turbine, when power was not being generated.

C1898 a concrete dam was built upstream of the guest house on Pound Creek, from which water was reticulated. This dam is now covered by the No. 1 Carpark, but the original concrete wall is visible. It was replaced in 1902 by a new concrete dam 20 chains upstream "on the mountain torrent". This dam still exists, but was decommissioned for health reasons in the late 1980s.

Supply was augmented in 1914 by construction of an intake from the Underground River adjacent the Sydney side of "de Burgh's" bridge. This is the current source, although there have been upgradings and extensions over the years as demand grew.

Sewerage

It can reasonably be assumed that the first systems were pit toilets or latrines discharging into creeks.

In 1898 a sewer line was constructed from the guest house through the Grand Arch and down the right bank of Jenolan River, to discharge raw sewage through an outfall downstream of the "bathing hole".

The first treatment system was constructed in 1906. It was a single chamber concrete septic tank built a little further downstream on the right bank of the river, with the effluent discharged to the stream. The plans are signed by "E.M. de Burgh for Principal Engineer, Water Supply and Drainage" and by "H.H. Dare, Assistant Engineer". The remains of the tank are still in place, buried under gravel and silt and subject to a non-disturbance decree until they can be archaeologically investigated.

The septic tank was replaced in 1909 with a three cell septic tank on the hillside above the present treatment works. It discharged effluent by gravity into a parallel filter box filled with broken stone, and from there into the Jenolan River. Plans for this were signed by "L.A.B. Wade, Chief Engineer Irrigation & Drainage".

The next system was constructed in 1954 and comprised an integrally constructed sedimentation and digestion tank. Sludge was drawn off to drying beds and disposed as landfill. Effluent was discharged for treatment to an 18 foot diameter trickling filter and from there to a detention pond for sterilisation, before draining to the river.

The current treatment works was constructed in 1975, on the flat ground below the others. It is a 500 person capacity Pasveer Channel and produces a high quality secondary treated effluent, which is sterilised by ultra violet light before discharging to the river. Sludge is dried and disposed as landfill.

Lighting and Power Generation

Jenolan Caves is one of the first instances of electric cave lighting in the world.

In 1880 E.C. Cracknell of Sydney Telegraph and early lighting fame, illuminated the Margherita Cave with electric lights using lead-zinc batteries. Then in 1887 a 6 HP steam engine and generator was installed within the Grand Arch for lighting the Imperial Cave. However, the steam engine caused pollution and was inadequate when more power was needed.

The change over to cheap hydro power occurred in 1889 with the installation of a Leffel turbine driving a 10 HP Crompton dynamo. It was on the left bank of the Jenolan River, about 200 metres downstream of the Grand Arch. Just below the arch, was a pipehead weir to divert water into the turbine through 650 mm diameter wrought iron penstock pipes. In about 1893 a layshaft was installed and an additional dynamo added to extend lighting to the Lucas Cave.

The Leffel installation lit the caves through an extensive network of wires, lights and switchboards. It was possibly the first hydro electric station in Australia and its remains can still be seen.

In 1908 a concrete arch dam of 100 feet radius and 33 feet high was built some distance downstream of the weir, and the hydro take off was moved to its downstream face. The plan of the dam was signed on 19.3.08 by E.M. de Burgh, Principal Assistant Engineer and E.M. de Burgh for Chief Engineer Rivers Water Supply & Drainage. The dam formed what is now the Blue Lake and is still the head pond for the present hydro station.

A new hydro electric station was built in 1916 about 900 metres below the limestone bridge. It comprised two Pelton wheel turbines driving two 20 kW generators, with marble switch boards and knife switches. Whilst the generators are still available as back-ups, the switch boards have been replaced by modern equipment, but are still in place.

The present main-load hydro turbines were installed in 1953.

Access Within the Caves

Initially access in the caves was arduous and sometimes hazardous. Visitors clambered over fallen rocks, squeezed through narrow passages, held onto ropes during near vertical descents and climbs, and waded through water.

From the 1880s the caves were made safer for visitors with widened passages, paths and steps cut into the rock, and the installation of ladders, some of timber, but mostly of iron. In 1880 a 32 feet span iron bridge with timber deck was constructed in the Lucas Cave - it is still in use.

Since the turn of the century when cement became more readily available, concrete has been used to form paths, steps and stairways. There are now many kilometres of paths, steps and fences, mostly constructed by guides. This represents an incredible expenditure of physical effort, as all materials have to be carried in limited capacity packs, and the concrete mixed and placed by hand.

The most recent major improvement to cave access was the Binoomea Cut, completed in 1954. This is a short tunnel from the Caves House side of the hill into the Temple of Baal Cave to improve access to it and to the Orient Cave. Careful tunnelling ensured negligible damage and airlock doors have been installed to isolate the cave environment from external air currents.

Public Works Department

Most of the architectural and engineering work at Jenolan has been carried out by the Public Works Department of NSW.

L.A.B Wade was an accomplished and innovative dam designer and in 1913 became the first Commissioner of the Water Conservation and Irrigation Commission.

E.M. de Burgh achieved fame as both a bridge and dam designer.

H.H. (Harvey) Dare took charge of the Public Works drawing office in 1905. He became Chief Engineer Water Conservation and Irrigation in 1909 and in 1913 was appointed the first Chief Engineer of the Water Conservation and Irrigation Commission.

Plaque Wording

HISTORIC ENGINEERING MARKER

JENOLAN CAVES ENGINEERING WORKS

ENGINEERING HAS PLAYED A MAJOR PART IN ESTABLISHING JENOLAN CAVES AS A SIGNIFICANT TOURIST DESTINATION. DESIGNED BY PUBLIC WORKS DEPARTMENT ENGINEERS, THE FIRST ROAD ACCESS WAS COMPLETED IN 1879, THE FIRST WATER SUPPLY DAM C1897 AND THE FIRST SEWERS C1898. WITHIN THE CAVES, PATHS, STAIRS, LADDERS, FENCES AND BRIDGES WERE BUILT BY GUIDES. ELECTRIC LIGHTING IN THE CAVES WAS AT THE FOREFRONT OF TECHNOLOGY IN 1889. COLLECTIVELY THE WORKS ARE ESSENTIAL FOR EASY ACCESS, THE SAFETY OF VISITORS AND PROTECTION OF THE ENVIRONMENT.

**DEDICATED BY
THE INSTITUTION OF ENGINEERS, AUSTRALIA
AND THE JENOLAN CAVES RESERVE TRUST 1996**

M.N. Clarke
15 July 1996

JENOLAN CAVES PLAQUING CEREMONY

Speech Notes for Mike Goethel

Ladies and Gentlemen

It is not easy for us to imagine today, the difficulties and the privations suffered by our early pioneers and explorers. We gain just a little insight into this when travelling today to places like Jenolan Caves. A substantial part of the beauty of the mountains lies in their ruggedness, the steepness of the slopes and the wilderness-like quality of this remote location that still persists. We can imagine how difficult travel would be, without our engineered roads.

The people who discovered the Caves travelled through uncharted country, not knowing what they would find and what lay around the next bend. The worst we might expect around the next bend today is a bus loaded with international tourists!

The first visitors travelled on horseback and bivouacked in primitive conditions. They clambered over fallen rocks, squeezed through narrow passages, held onto ropes during near vertical descents and climbs, and waded through water, whilst lighting their way with candles.

Today we arrive by air conditioned car or tourist coach over good roads and find all the amenities of city living - comfortable accommodation, excellent cuisine, clean and safe drinking water, sewage treatment facilities that don't pollute the environment, and excellent paths, steps and lighting within the caves.

We tend to take all this for granted without giving a thought to the engineers who developed the technology and applied their knowledge to provide appropriate and affordable solutions to the problems of developing this premier tourist destination.

The engineering we find here is not spectacular, although some of it is quite interesting from an historical and heritage point of view, but it is a microcosm of what engineers provide to make a town or a city a safe, healthy and pleasant place to live and work.

The caves were one of the first systems in the world to be lit by electricity. The little Leffel hydro electric turbine, the remains of which still lie on the banks of the Jenolan River, was when it was installed in 1889, probably the first hydro electric generator in Australia.

Within the Caves' precinct are the remains of a succession of sewage treatment facilities, which represent the progression of sewage treatment technology over about the last hundred years. Under sand and gravel on the right bank of the river are the remains of the first septic tank, built in 1906. It was replaced in 1909 by a three cell septic tank on the hillside above the present treatment works, discharging into stone filter beds.

The next treatment plant was constructed nearby in 1953 and comprised a sedimentation tank, a digestion tank, a trickling filter, a chlorination tank, an effluent detention pond for sterilisation, and sludge drying beds.

And the present works is a Pasveer channel built in 1975 on the flat ground below the previous works. It produces a high quality effluent which is sterilised by ultra violet light before discharge to the river, to avoid the impact chlorine might have on cave formations downstream.

Over the years the water supply has progressed from pumping direct from the river, to dams on the quick flowing stream above Caves House, to the present supply drawn from the Underground River. And like all the engineering works here, the water supply has been continuously upgraded without fuss, to meet the growing needs of the visitors and the Caves management.

Within the caves over the years the guides have expended an unbelievable amount of effort in constructing paths, steps, bridges, ladders and fences. I'm sure most people give no thought at all to

the fact that virtually all the materials - the concrete ingredients, the steel, timber and wire - were carried in on their backs! An extraordinary effort that still goes on and one of which they can all be extremely proud!

Most of the architectural and engineering work at Jenolan has been carried out by the Public Works Department of NSW.

One final thing about the engineering works at Jenolan - they have an association with a number of distinguished and historically important turn-of-the-century engineers of the Public Works Department.

Signatories to various plans are:

L.A.B Wade - he was an accomplished and innovative dam designer. Amongst other things, he designed the Medlow Bath Dam on the Blue Mountains, which when completed in 1907, was the most slender arch dam in the world. In 1913 he became the first Commissioner of the Water Conservation and Irrigation Commission.

H.H. (Harvey) Dare took charge of the Public Works drawing office in 1905. He became Chief Engineer Water Conservation and Irrigation in Public Works in 1909 and in 1913 was appointed the first Chief Engineer of the Water Conservation and Irrigation Commission.

E.M. de Burgh, the designer of the beautiful little limestone arch bridge, which you cross just before entering the Grand Arch, achieved fame as both a bridge and dam designer. But like the others, he was a well rounded engineer, being the signatory to many of the water supply and sewerage plans of Jenolan and other places.

Ladies and gentleman, The Institution of Engineers is proud of the achievements of engineers. We're proud of their immense contribution to the development of Australia, to our prosperity and high living standards, to safeguarding our health, to being able to drink clean water from the tap where ever you go, to conservation of the environment and to the development of places like Jenolan, so visitors from Australia and around the World can enjoy and marvel at the wonderful creations of nature.

The plaque we are about to unveil today commemorates the part played by engineers and the caves guides in the development of this wonderful tourist destination. The words on the plaque read:

ENGINEERING HAS PLAYED A MAJOR PART IN ESTABLISHING JENOLAN CAVES AS A SIGNIFICANT TOURIST DESTINATION. DESIGNED BY PUBLIC WORKS DEPARTMENT ENGINEERS, THE FIRST ROAD ACCESS WAS COMPLETED IN 1879, THE FIRST WATER SUPPLY DAM C1897 AND THE FIRST SEWERS C1898. WITHIN THE CAVES, PATHS, STAIRS, LADDERS, FENCES AND BRIDGES WERE BUILT BY GUIDES. ELECTRIC LIGHTING IN THE CAVES WAS AT THE FOREFRONT OF TECHNOLOGY IN 1889. COLLECTIVELY THE WORKS ARE ESSENTIAL FOR EASY ACCESS, THE SAFETY OF VISITORS AND PROTECTION OF THE ENVIRONMENT.

**DEDICATED BY
THE INSTITUTION OF ENGINEERS, AUSTRALIA
AND THE JENOLAN CAVES RESERVE TRUST 1996**

I would now like to invite Mr of to join with me in unveiling this plaque declaring the Jenolan Caves Engineering Works an Historic Engineering Marker.

JENOLAN CAVES PLAQUING CEREMONY Speech Notes for Paul Hagenbach

Ladies and Gentlemen

The Institution of Engineers established the Historic Engineering Plaquing Program as a means of commemorating and bringing public attention to significant historic engineering works and the engineers who created them.

Two types of plaques are awarded. The most prestigious is the **National Engineering Landmark**.

This is awarded to items that have made a significant contribution to the development of Australia and to the practice of engineering. These works are not only a part of Australia's engineering heritage, but are a significant component of the National Estate.

Items of lesser significance nationally, or which are only significant within a particular State, region or community, may be awarded an **Historic Engineering Marker**.

To date National Engineering Landmark plaques have been awarded to works like the Coolgardie Goldfields Water Supply Scheme in Western Australia, Waddamana 'A' Power Station in Tasmania and Newcastle Harbour and the Snowy Mountains Hydro Electric Scheme in New South Wales.

..... Historic Engineering Landmark plaques have been awarded covering such diverse works as the Furphy Water Cart, Smith's Stump Jump Plough, a mine Winding Engine in Queensland, Goolwa-Port Elliot Railway in South Australia, Richmond Bridge in Tasmania - the oldest standing bridge in Australia, Princess Royal Battery and Magazine in Western Australia and Lithgow Blast Furnace, Locomotive 3801 and the Annandale Sewerage Aqueducts in New South Wales.

The Program is conducted by the National Committee on Engineering Heritage, with the plaquing nominations being made mostly by the Divisional Committees.

All nominations are carefully evaluated by the Commemorative Plaquing Sub Committee to ensure the claims made are accurate and the nomination satisfies the required standards.

The nomination report for Jenolan Caves was prepared by Dr Don Fraser (who unfortunately cannot be with us today) and by Michael Clarke. I would like to thank and congratulate them for their effort.

In preparing the nomination, they were greatly assisted by officers at the Caves, in particular the Karst Resources Manager Ernst Holland and by Joan Edwards and Sue Hardy of the Jenolan Caves Historical and Preservation Society (JCHAPS). For their help, we are most grateful and extend our sincere thanks to them.

Piecing together the history of the engineering at Jenolan has not been easy. In addition to the invaluable information provided through JCHAPS, it has required a great deal of research - in places like libraries and the plan rooms of Public Works' Head Office and Bathurst. Even now there are some "holes", which hopefully can be filled in the future, through detailed research by others. Don and Michael were unable to go further because of time constraints.

However, the Nomination Report will make a substantial contribution to the Trust's and JCHAPS' knowledge and understanding of the significance of the engineering effort.

I would now like of the Jenolan Caves Historical and Preservation Society, to come forward and receive the plans and a copy of the Nomination Report for their archives.



The Chairman
of
the Jenolan Caves Reserve Trust
Mr. Warwick Bennet



The President
of The Sydney Division
of The Institution of Engineers, Australia
Mrs. Elizabeth Taylor

are pleased to invite

.....
to the unveiling of an
HISTORIC ENGINEERING MARKER
commemorating the part played by Engineering in developing and establishing
JENOLAN CAVES
as a significant tourist destination.

10 am Saturday 28 September 1996
at Jenolan Caves

RSVP: Faye Christopher
(063) 325 888 by 20/9/96

Commemorative Plaquing of Jenolan Caves Engineering Works

PROGRAM



Saturday 28 September, 1996

Commencing 10.00am.

Introduction

Mr Ted Reedy – General Manager, Jenolan Caves Reserve Trust

Welcome

Mr Warwick Bennet – Chairman, Jenolan Caves Reserve Trust

Historic Engineering Plaquing Program and Presentation to
Jenolan Caves Historical and Preservation Society

**Mr Paul Hagenbach – Chairman National Committee on
Engineering Heritage, The Institution of Engineers, Australia**

Jenolan Caves Reserve Trust, Conservation Values and Legislation

The Hon. Jan Burnswoods, MLC

(Representing the Minister for the Environment)

Jenolan Caves Engineering Works

**Mr Mike Goethel – Vice President, Sydney Division of
The Institution of Engineers, Australia**

Unveiling of Plaque

**Mr Mike Goethel – The Institution of Engineers, Australia and
Mr Warwick Bennet – Chairman, Jenolan Caves Reserve Trust**

Close, Morning Tea & Special Guided Tour

Access Within the Caves

Initially access in the caves was arduous and sometimes hazardous. Visitors clambered over fallen rocks, squeezed through narrow passages, held onto ropes during near vertical descents and climbs, and waded through water.

From the 1880s the caves were made safer for visitors with widened passages, paths and steps cut into the rock, and the installation of ladders, some of timber, but mostly of iron. In 1880 a 32 feet span iron bridge with timber deck was constructed in the Lucas Cave - it is still in use.

Since the turn of the century when cement became more readily available, concrete has been used to form paths, steps and stairways. There are now many kilometres of paths, steps and fences, mostly constructed by guides. This represents an incredible expenditure of physical effort, as all materials have to be carried in limited capacity packs, and the concrete mixed and placed by hand.

The most recent major improvement to cave access was the Binomea Cut, completed in 1954. This is a short tunnel from the Caves House side of the hill into the Temple of Baal Cave to improve access to it and to the Orient Cave. Unfortunately this tunnelling did cause damage. Airlock doors have been installed to protect the cave from drying out due to the increased airflow. A ramp has been added this year to allow wheelchair access.

Public Works Department

Most of the architectural and engineering work at Jenolan has been carried out by the Public Works Department of NSW.

L.A.B. Wade was an accomplished and innovative dam designer and in 1913 became the first Commissioner of the Water Conservation and Irrigation Commission.

E.M. de Burgh achieved fame as both a bridge and dam designer.

H.H. (Harvey) Dare took charge of the Public Works drawing office in 1905. He became Chief Engineer Water Conservation and Irrigation in 1909 and in 1913 was appointed the first Chief Engineer of the Water Conservation and Irrigation Commission.

Plaque Wording

HISTORIC ENGINEERING

MARKER

JENOLAN CAVES ENGINEERING WORKS

Engineering has played a major part in establishing Jenolan Caves as a significant tourist destination. Designed by Public Works Department Engineers, the first road access was completed in 1879, the first water supply dam c1897 and the first sewers c1898. Within the caves, paths, stairs, ladders, fences and bridges were built by guides. Electric lighting in the caves was at the forefront of technology in 1889. Collectively the works are essential for easy access, the safety of visitors and protection of the environment.

DEDICATED BY

THE INSTITUTION OF ENGINEERS, AUSTRALIA
AND THE JENOLAN CAVES RESERVE TRUST 1996.



Official Ceremony for the Commemoration of

Historic Engineering Works

at

Jenolan Caves

**The Grand Arch
Jenolan Caves**

Saturday 28th September 1996



Jenolan Caves Engineering Works

The Jenolan Caves are a world renowned example of limestone caves surrounded by a 2416 hectare wildlife reserve. They have been open to the public for over 150 years and are believed to have been first explored by European settlers in 1838.

Originally parties of tourists reached the caves after a full days slow horse ride usually from Tarana, with pack horses laden with provisions and camping equipment. The final descent to the Grand Arch was by foot.

Within the caves, each visitor carried a lighted candle and scrambled over rocks and through what natural passageways they could find. Smoke and dripping wax from the candles caused pollution and discoloured formations, and visitors broke off pieces of the formations for souvenirs.

Drinking water was obtained from the then pristine streams, whilst toilet and waste disposal facilities were of the most primitive kind.

Fortunately, there was early recognition of the threat of pollution and despoliation. The caves and the surrounding country were declared a public reserve on 2 October 1866 and a year later, Jeremiah Wilson was appointed non-resident caretaker. In 1872 the Government issued a notice making "mutilating and destroying stalactites" a punishable offence.

As tourism developed, so did the need for better access, accommodation, illumination, water supply and sewerage.

Roads

The first road into the caves was from Tarana railway station via Hazelgrove and Oberon. It was completed in 1879 with the Zig Zag or Two Mile Hill descent.

The extension of the then existing road to Hampton and construction down the Five Mile Hill was completed to within half a kilometre of the Grand Arch in 1887. Visitors alighted at the "turntable" and walked to the caves or accommodation, while their luggage followed on pack horses.

Nine years later (1896) the road was extended through the Grand Arch to link up with the Oberon Road. It crossed the Jenolan River on the beautiful limestone arch bridge designed by the Public Works engineer E.M. de Burgh.

Accommodation

Jeremiah Wilson built the first accommodation in about 1880 and the first two storey guest house in 1887. He added another by the early 1890s, but it burnt down in 1895.

A new limestone wing was added to the original two storey building in 1897 and there were further expansions of accommodation in 1916, 1923 and 1986.

Water Supply

The first significant water supply (c1897) was an hydraulic ram on the Jenolan River downstream of the Grand Arch, pumping to a small concrete reservoir just beyond the guest house. It was replaced by a pump driven off the Leffel water turbine, when power was not being generated.

C1898 a concrete dam was built upstream of the guest house on Camp Creek, from which water was reticulated. This dam is now covered by the No. 1 Capark, but the original concrete wall is visible. It was replaced in 1902 by a new concrete dam 20 chains upstream "on the mountain torrent". This dam still exists, but was decommissioned for health reasons in the late 1980s.

Supply was augmented in 1914 by construction of an intake from the Underground River adjacent to the Sydney side of "de Burgh's" bridge. This is the current source, although there have been upgrades and extensions over the years as demand grew.

Sewerage

It can reasonably be assumed that the first systems were pit toilets or latrines discharging into creeks. In 1898 a sewer line was constructed from the guest house through the Grand Arch and down the right bank of Jenolan River, to discharge raw sewage through an outfall downstream of the "bathing hole".

The first treatment system was constructed in 1906. It was a single chamber concrete septic tank built a little further downstream on the right bank of the river, with the effluent discharged to the stream. The plans are signed by "E.M. de Burgh for Principal Engineer, Water Supply and Drainage" and by "H.H. Dare, Assistant Engineer". The remains of the tank are still in place, buried under gravel and silt and subject to a non-disturbance decree until they can be archaeologically investigated.

The septic tank was replaced in 1909 with a three cell septic tank on the hillside above the present treatment works. It discharged effluent by gravity into a parallel filter box filled with broken stone, and from there into the Jenolan River. Plans for this were signed by L.A.B. Wade, Chief Engineer Irrigation & Drainage".

The next system was constructed in 1954 and comprised an integrally constructed sedimentation and digestion tank. Sludge was drawn off to drying beds and disposed as landfill. Effluent was discharged for treatment to an 18 foot diameter trickling filter and from there to a detention pond for sterilisation, before draining to the river.

The current treatment works was constructed in 1975, on the flat ground below the others. It is a 500 person capacity Pasveer Channel and produces a high quality secondary treated effluent, which is sterilised by ultra violet light before discharging to the river. Sludge is dried and disposed as landfill.

Lighting and Power Generation

Jenolan Caves is one of the first instances of electric cave lighting in the world.

In 1880 E.C. Cracknell of Sydney Telegraph and early lighting fame, illuminated the Margherita Cave with electric lights using lead-zinc batteries. Then in 1887 a 6 HP steam engine and generator was installed within the Grand Arch for lighting the Imperial Cave. However, the steam engine caused pollution and was inadequate when more power was needed.

The change over to cheap hydro power occurred in 1889 with the installation of a Leffel turbine driving a 10 HP Crompton dynamo. It was on the left bank of the Jenolan River, about 200 metres downstream of the Grand Arch. Just below the arch, was a pipehead weir to divert water into the turbine through 650 mm diameter wrought iron penstock pipes. In about 1893 a layshaft was installed and an additional dynamo added to extend lighting to the Lucas Cave.

The Leffel installation lit the caves through an extensive network of wires, lights and switchboards. It was possibly the first hydro electric station in Australia and its remains can still be seen.

In 1908 a concrete arch dam of 100 feet radius and 33 feet high was built some distance downstream of the weir, and the hydro take off was moved to its downstream face. The plan of the dam was signed on 19.3.08 by E.M. de Burgh as Principal Assistant Engineer and also on behalf of the Chief Engineer Rivers Water Supply & Drainage. The dam formed what is now the Blue Lake and is still the head pond for the present hydro station.

A new hydro electric station was built in 1916 about 900 metres below the limestone bridge. It comprised two Pelton wheel turbines driving two 20 kW generators, with marble switch boards and knife switches. Whilst the generators are still available as back-ups, the switch boards have been replaced by modern equipment, but are still in place.

The present main-load hydro turbines were installed in 1953.



Mr Ted Reedy, General Manager,
Jenolan Caves Reserve Trust



Mr Warwick Bennet, Chairman
Jenolan Caves Reserve Trust



The Hon. Jan Burnswoods, MLC



Mr Paul Hagenbach, Chairman
National Committee on Engineering Heritage



Jan Burnswoods, Mike Goethel, Paul Hagenbach and Warwick Bennet



Mr Mike Goethel, Vice President, Sydney Division of
The Institution of Engineers



Unveiling the Plaque:

Paul Hagenbach, Warwick Bennet, Mike Goethel, Jan Burnswoods





Guests at the plaquing ceremony



Prof. Emory Kemp, Mrs Janet Kemp and Mrs Annie Clarke



Mrs Susan Hardy and Mrs Joan Edwards of JCHAPS



JENOLAN CAVES RESERVE TRUST

1 October, 1996

Mr Michael Clarke
41 Portland Street
ENFIELD NSW 2136

Dear Michael

The Trust members and staff of the Jenolan Caves Reserve Trust thank you and the Institution of Engineers, Australia for the commemoration of the historic engineering works at Jenolan Caves, in the plaquing ceremony last Saturday. We are pleased that the role engineering has played in establishing Jenolan Caves as a major tourist destination has been recognised in this way.

I enclose some photographs of the ceremony, a copy of the media articles which appeared in the Bathurst and Oberon newspaper and some extra souvenir brochures and programs for distribution or for your records.

I look forward to the opportunity of meeting with you again.

Kind regards

A handwritten signature in black ink, appearing to read 'Ted Reedy', written over a horizontal line.

Ted Reedy
General Manager

JENOLAN CAVES RESERVE TRUST

PO BOX 1495, BATHURST NSW 2795. TELEPHONE: (063) 32 5888 FAX: (063) 32 9399

INCORPORATING JENOLAN CAVES, ABERCROMBIE CAVES & WOMBEYAN CAVES

Printed on recycled paper

Engineers mark Jenolan Caves feats

As the usual weekend crowd of tourists marvelled on Saturday at the feats of natural engineering which created the Jenolan Cave system over a million years, engineers from Australia and around the world gathered to celebrate the feats of human engineering which have opened the cave system to the public over the past 100 years.

The thousands of visitors who pass through Jenolan Caves limestone caverns each year probably never give a passing thought to the engineering skill which has played a major role in establishing it as a popular tourist attraction.

But the Australian Institution of Engineers on Saturday declared the Jenolan Caves an historic engineering landmark in recognition of the century of engineering expertise.

More than 100 years of engineering works began with the first road access in 1879.

Jenolan Caves Reserve Trust manger, Ted Reedy, said visitors were able to enjoy the caves today because of the roads, lighting, paths, steps and other works built over the years.

"The engineering works have been essential for providing easy and safe access to the 270,000 visitors who each year admire the limestone caves and formations developed over millions of years," Mr Reedy said.

"The caves have been open to the public for the past 150 years, increasing the need for better access, accommodation, illumination, water supply and sewerage as tourism developed."

Mr Reedy said the caves' first supply dam was built about 1897, with the first sewers installed about 12 months later.

"Electric lighting in the caves was at the leading edge of technology when it was installed in 1889 and meant that visitors no longer had to carry a lighted candle to scramble over rocks and through natural passageways.

"Over the years, guides built and improved paths, stairs, ladders, fences and bridges inside the caves to make them accessible to the public."

"The engineering works have also been very important to minimising human impact and preserving the natural caves environment."

A plaque unveiling ceremony was attended by a party of engineers, some from overseas, before they took part in an International Engineering Heritage Conference in Newcastle.

The Australian Engineering Plaquing Program was established as a way of bringing public recognition to significant historic engineering works and the engineers who created them.

Most of the architectural and engineering work at Jenolan Caves has been carried out by the NSW Public Works Department.

Jenolan Caves An Engineering Feat

The thousands of visitors who pass through Jenolan Caves limestone caverns each year probably never give a passing thought to the engineering skill which has played a major role in establishing it as a popular tourist attractions.

More than one hundred years of engineering works - beginning with the first road access in 1879 - have turned Jenolan Caves into the accessible and safe Australian icon that it is today.

The Australian Institution of Engineers this month declare the Jenolan Caves an historic engineering landmark in recognition of the century of engineering expertise.

Jenolan Caves Reserve Trust General Manager, Ted Reedy, said visitors were able to enjoy the caves today because of the roads, lightings, paths steps and other works built over the years.

"The engineering works have been essential for providing easy and safe access to the 270,000 visitors who each year admire the limestone caves and formations developed over millions of years," Mr Reedy said.

"The caves have been open to the public for the past one hundred and fifty years, increasing the need for better access, accommodation, illumination, water supply and sewerage as tourism developed."

Mr Reedy said the Caves' first supply dam was built about 1897, with the first sewers installed about twelve months later.

"Electric lighting in the caves was at the leading edge of technology when it was installed in 1889 and meant that visitors no longer had to carry a lighted candle to scramble over rocks and through natural passageways."

"Over the years, guides, built and improved paths, stairs, ladders, fences and bridges inside the caves to make them accessible to the public."

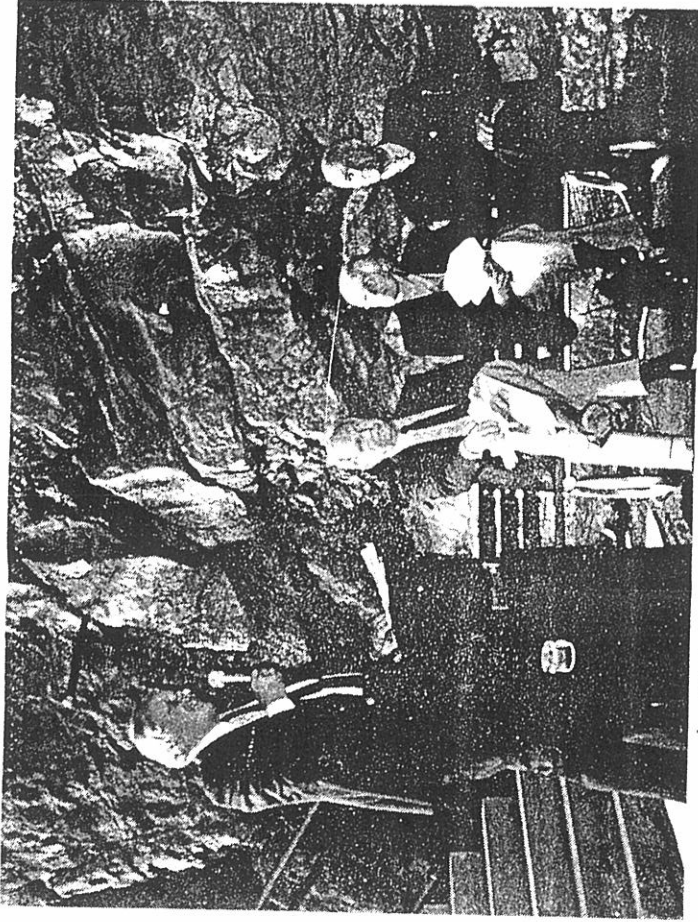
"The engineering works have also been very important to minimising human impact and preserving the natural caves environment."

The Institution of Engineers and the Jenolan Caves Reserve Trust unveiled a plaque commemorating the part played by engineers in the development of Jenolan Caves at a special ceremony last Saturday, September 28. The Minister for the Environment, to whom the Trust reports, was represented by the Hon. Jan Burswoods MLC.

The ceremony was attended by a party of engineers, some from overseas, before they take part in an International Engineering Heritage Conference in Newcastle.

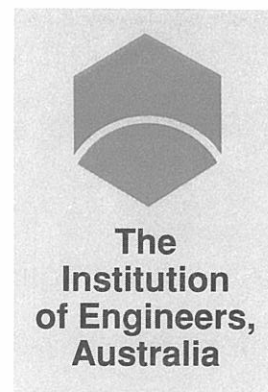
The Australian Engineering Plaques Program was established as a way of bringing public recognition to significant historic engineering works and the engineers who created them.

Most of the architectural and engineering work at Jenolan Caves has been carried out by the NSW Public Works Department



The unveiling of the Commemorative Plaque

41 Portland Street
Enfield NSW 2136
10 October 1996



SYDNEY DIVISION

Mr Ted Reedy
General Manager
Jenolan Caves Reserve Trust

Dear Ted

The members of The Institution and our visitors would like to express their appreciation to you and your staff, for your co-operation, organisation and exceptional hospitality in connection with the historic plaquing of the Jenolan Caves Engineering Works. The arrangements worked splendidly and the invitations, program and pamphlet were most fitting to the occasion.

Would you extend our special thanks to Barry Richards for the excellent cave tours - those who went on them were extremely impressed and were appreciative of the thought and care he gave to the itinerary and his explanations.

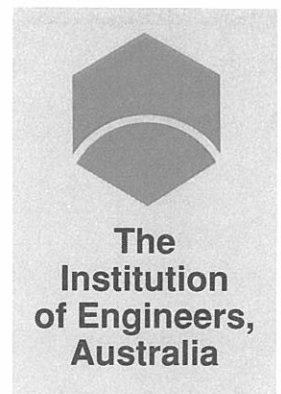
I enjoyed working with you and your staff on this project - it has been a very successful partnership between the Trust and The Institution. The plaquing event was a highlight of the pre conference tour and set the stage for an excellent conference in Newcastle.

Thank you also for your kind letter and the media articles, photos and extra brochures - they will be most useful.

With kind regards

Michael Clarke
Chairman
Engineering Heritage Committee

41 Portland Street
Enfield 2136
21 September 1996



SYDNEY DIVISION

Ms Jean Rice
Acting Manager Heritage Section
Department of Public Works and Services
Level 19 McKell Building
Rawson Place
Sydney NSW 2000

Dear Jean

**Award of an Historic Engineering Marker
to
JENOLAN CAVES ENGINEERING WORKS**

On Saturday 28 September 1996, the part played by engineers and the Caves guides in the development of the Jenolan Caves, will be commemorated by the unveiling of an Historic Engineering Marker plaque. The event will be part of The Institution's *Australian Historic Engineering Plaquing Programme*.

We felt it important that you receive a copy of the nomination report and appendices for your records, particularly in view of the part played by Public Works in the development of the Caves precinct and the valuable help given by your officers, by Tony Mitchell and by the Bathurst office during the report's preparation. These documents are therefore supplied herewith.

Piecing together the history of the engineering at Jenolan has not been easy. Even now there are some "holes" (and possibly errors), which hopefully can be filled (and corrected) in the future, through detailed research by others. However, we feel the Nomination Report will make a substantial contribution to the knowledge and understanding of the significance of the engineering effort.

Before a nomination can be accepted under the Programme, it is carefully evaluated to ensure the claims made are accurate and the nomination satisfies the required standards. A copy of the Guide to the Programme is enclosed.

For the Plaquing ceremony I have prepared draft speech notes and notes for the preparation by the Caves Reserve Trust, of a pamphlet about the engineering works. As these may also be of interest, copies are also enclosed. In explanation of the names on the headings of the speech notes, Mike Goethel is Sydney Division's Vice President and Paul Hagenbach is Chairman of the National Committee on Engineering Heritage.

Yours sincerely

Michael N Clarke
Chairman
Engineering Heritage Committee

Telephone and Fax: 9745 3752

Jenolan Caves Engineering Works

location Jenolan Caves precinct including access roads down the Five Mile Hill and the Zig Zag from Oberon .
owner Jenolan Caves Reserve Trust.

the plaque

type **Historic Engineering Marker**

location On a rock next to the start of the track on the right bank of the Jenolan River, adjacent the limestone arch bridge.

The engineering at Jenolan is not spectacular, but is interesting historically and has heritage value. It is a microcosm of what engineers provide to make communities safe, healthy and pleasant places to live and work. Plans of the works were signed by eminent Public Works engineers De Burgh, Wade and Dare.

plaque text

Jenolan Caves Engineering Works

Engineering has played a major part in establishing Jenolan Caves as a significant tourist destination. Designed by Public Works

Department engineers, the first road access was completed in 1879, the first water supply dam C1897 and the first sewers C1898. Within the caves, paths, stairs, ladders, fences and bridges were built by guides. Electric lighting in the caves was at the forefront of technology in 1889.

Collectively the works are essential for easy access, the safety of visitors and protection of the environment.

Dedicated by The
Institution of Engineers,
Australia and the Jenolan
Caves Reserve Trust 1996.

E M de Burgh (1863-1929)

De Burgh was an expert bridge and dam engineer. He designed the limestone arch bridge over the Jenolan River and was involved in either the design or supervision of many major dams in NSW. He signed many of the plans for water supply and sewerage at Jenolan.

LAB Wade (1864-1915)

Wade was an innovative and accomplished dam designer and in 1913 became the first Commissioner of the Water Conservation and Irrigation Commission.

HH Dare (1867-1949)

Dare was an accomplished designer and became first Chief Engineer of the Water Conservation and Irrigation Commission.

3/6/106

26A Campbell Avenue
Normanhurst NSW 2076
1 June 1998



**The
Institution
of Engineers,
Australia**

SYDNEY DIVISION

Ms Penny Sutherland
Administrator
National Committee on Engineering Heritage
The Institution of Engineers, Australia
11 National Circuit
Barton ACT 2600

Dear Penny

**Jenolan Caves Engineering Works
Location of Historic Engineering Marker**

Enclosed is a sheet of photographs and two colour photocopies, showing the Marker fixed in its permanent position on a block of local limestone, placed at the start of the Blue Lake Walking Track, adjacent the Grand Arch.

Would you please insert the sheets in the file and Library copies of the Ceremony Report.

Yours sincerely

Michael Clarke
Engineering Heritage Committee, Sydney

**Jenolan Caves Engineering Works
Permanent Location of Historic Engineering Marker**



Plaque located at start of Blue Lake Walking Track.
The Grand Arch is immediately to the right in the photograph



Plaque fixed to a block of local limestone.